

## 中国毛锦藓科植物增补\*

贾 渝<sup>1\*\*</sup>, 何 思<sup>2</sup>

(1 中国科学院植物研究所 系统与进化植物学国家重点实验室, 北京 100093;

2 美国密苏里植物园, 密苏里州, 圣. 路易斯市)

**摘要:** 在对毛锦藓科的分类学修订中, 我们报道 3 个种和 1 变种在中国的新分布记录, 它们是: 外弯小锦藓 *Brotherella recurvans*、纤枝疣胞藓 *Clastobryum cuculligerum*、海岛麻锦藓 *Taxithelium liukuense*、扭尖金枝藓阔叶变种 *Trismegistia calderensis* var. *rigida*。这些新记录物种的标本分别采自海南、香港和云南。

**关键词:** 中国; 新记录; 毛锦藓科; 锦藓科; 分类学

中图分类号: Q 949

文献标识码: A

文章编号: 2095-0845(2014)06-771-10

## Additions to the Chinese Pylaisiadelphaceae (Bryopsida)

JIA Yu<sup>1\*\*</sup>, HE Si<sup>2</sup>

(1 State Key Laboratory of Systematic and Evolutionary Botany, Institute of Botany, Chinese Academy of Sciences, Beijing 100093, China; 2 Missouri Botanical Garden, P. O. Box 299, St. Louis, MO 63166-0299, U. S. A. )

**Abstract:** Three species and one variety: *Brotherella recurvans*, *Clastobryum cuculligerum*, *Taxithelium liukuense* and *Trismegistia calderensis* var. *rigida* are reported as new records to China, and their description and illustrations are provided. These new records are based on the specimens from Hainan, Hong Kong and Yunnan.

**Key words:** China; New record; Pylaisiadelphaceae; Sematophyllaceae; Taxonomy

The Sematophyllaceae is one of the most taxonomically difficult moss families in the Chinese bryoflora. The family in China was first revised by Tan and Jia (1999) and its floristic treatments were later provided by Jia and Wu (2004) and Jia, Wu and Tan (2005). A total of 18 genera 45 species and 6 varieties/forms were reported in the latter studies. However, a great number of Sematophyllaceae specimens in several Chinese herbaria remain undetermined. During the course of our continuing study of the Chinese mosses, we encountered some interesting findings. In this paper, we report four records new to China, belonging to *Brotherella* Loeske ex M. Fleisch., *Clastobryum* Dozy & Molk., *Taxithelium*

*Spruce* ex Mitt., and *Trismegistia* (Müll. Hal.) Müll. Hal. respectively. According to the recently research results (Goffinet and Buck, 2004; Frey and Stech, 2009) based on molecular data, these four genera have been transferred to the Pylaisiadelphaceae, which we follow in this paper.

### 1. 外弯小锦藓 *Wai-wan-xiao-jin-xian*

*Brotherella recurvans* (Michx.) M. Fleisch., Nova Guinea **12** (2): 120. 1914. Fig. 1

*Pylaisiadelpha recurvans* (Michx.) W. R. Buck, Yushania **1** (2): 13. 1984.

*Leskea recurvans* Michx., Fl. Bor.-Amer. **2**: 311. 1803.

\* Funding: The National Natural Science Foundation of China (31370236)

\*\* Author for correspondence

Received date: 2014-01-16, Accepted date: 2014-03-25

作者简介: 贾 渝 (1966-) 男, 研究员, 主要从事苔藓植物分类学研究。E-mail: yjia@ibcas.ac.cn

Plants medium-sized, green, yellow or golden yellow, glossy. Stems subpinnately or irregularly branched, up to 2.2 cm long, branches 2.0–3.0 mm long, ca. 0.7 mm wide with leaves, ca. 0.4 mm in diameter, red brown, section cross of stems consist-

ted of large but thin-walled cells, central strand absent, leaves strongly curved at apex. Stem leaves ovate-lanceolate, or broadly ovate-lanceolate, apex erect, 1.3–1.5 mm long, 0.5–0.6 mm wide, leaf cells linear, median leaf cells 74.9–97.6  $\mu\text{m}$  long,

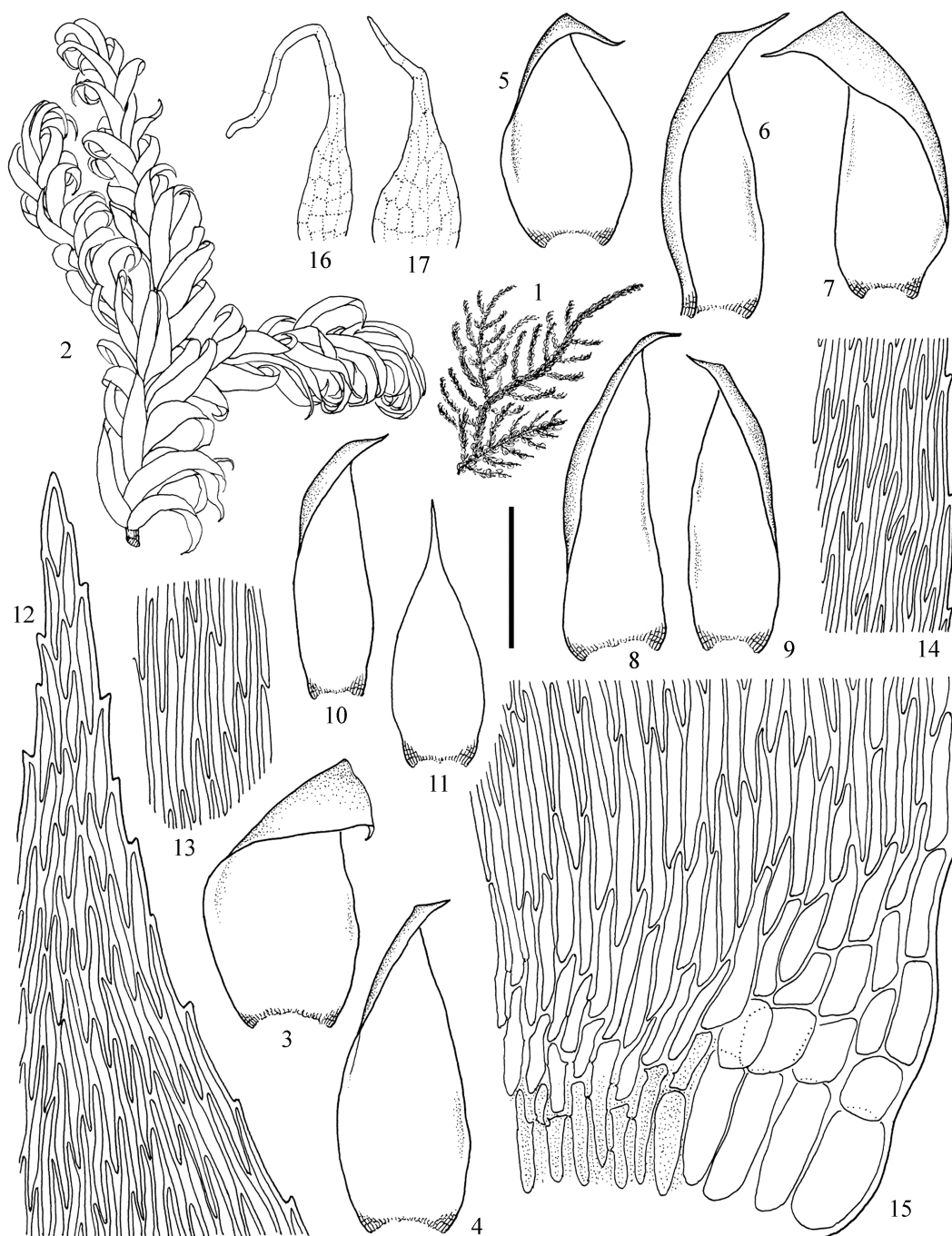


Fig. 1 *Brotherella recurvans* (Michx.) M. Fleisch.

1. Plant; 2. Branch; 3–4. Stem leaves; 5–9. Primary branch leaves; 10–11. Branch leaves; 12. Apical leaf cells; 13. Median leaf cells; 14. Median marginal leaf cells; 15. Basal leaf cells; 16–17. Pseudoparaphyllium. (Drawn from China, Yunnan, Menghai Co., Yu Jia 01334 (PE), Scale line: 1=2 cm; 2=1.8 mm; 3–11=0.7 mm; 12–15=54.5  $\mu\text{m}$ ; 16–17=105.6  $\mu\text{m}$ ) (Drawn by M. S. Guo)

4.5–5.7  $\mu\text{m}$  wide, alar cells not evidently differentiated, alar cells of outset 3–4, yellow, inflated, supra cells 2–3, slightly larger, colorless. Branch leaves ovate-lanceolate, or oblong-ovate, sometimes oblong-lanceolate, 1.0–1.2 mm long, 0.3–0.4 mm wide, spreading, loosely flatted, apex falcate-secund, slender acuminate, serrulate above. Median leaf cells of branch 62.0–85.3  $\mu\text{m}$  long, 4.1–6.0  $\mu\text{m}$  wide, upper leaf cells linear, becoming shorter and broader towards base, alar cells 4–8, evidently inflated, yellow, supra cells moderate, usually colorless.

Diocious. Inner perichaetial leaves broadly triangular-lanceolate, acostae, 1.7–2.2 mm long, 0.5–0.6 mm wide, apex long, erect acuminate, toothed, upper cells linear, colorless, 57.3–85.7  $\mu\text{m}$  long, 4.6–6.7  $\mu\text{m}$  wide, gradually becoming shorter and broader towards base, rectangular, yellow, 52.3–85.7  $\mu\text{m}$  long, 13.3–20.3  $\mu\text{m}$  wide. Setae 0.7–1.7 cm long, reddish brown. Capsules 1.0–1.6 mm long, ca. 0.8 mm in diameter, suberect or strongly inclined, asymmetric, oblong-cylindric, smooth, brown. Annula two rows cells. Opercula with a incline rostrate, opercula same as rostrate in length, ca. 0.5 mm long. Peristome yellow or brown, exostome teeth almost the same high as endostome segments in length, 364–397  $\mu\text{m}$  long, 70.8–78.2  $\mu\text{m}$  wide near base, median line and trabulate on outside surface multistriate, many slender striate in trabulation; endostome segments not perforation, cilia 1–2, long and slender. Spores round, 13–18  $\mu\text{m}$  in diameter, roughly papillose.

**Habitat:** on branch of tree, 1 945 m.

**Distribution:** Japan (Iwatsuki 2004), U. S. A. (Crum and Anderson, 1981). New to China.

Examined specimens: Yunnan, Menghai County, Jia Yu 01334 (PE).

According to Buck (1984), all species in the genus *Brotherella* should be transferred to *Pylaisiadelphina*. However, Ando *et al.* (1989) considered *Brotherella* to be a genus distinct from *Pylaisiadelphina*, with the type species of the two genera belong in different genera [*Brotherella*, type: *B. lorentiziana*

(Mol. ex Lor.) Loeske ex Fleisch.; *Pylaisiadelphina*, type: *P. raphidostegioides* (Card.) Card.]. The distinguishing features between *Brotherella* and *Pylaisiadelphina* were discussed by Ando *et al.* (1989). Several recent studies (Magill *et al.*, 1994; Crosby *et al.*, 1999; Tan and Jia, 1999; Buck and Goffinet, 2000; Tan, 2000a,b; Goffinet and Buck, 2004; Iwatsuki, 2004; Frey and Stech, 2009) have accepted *Brotherella* and *Pylaisiadelphina* as two independent genera.

*Brotherella recurvans* is previously known primarily in North America, the genus leave three species: *B. recurvans*, *B. roellii* (Ren. & Card.) Fleisch. and *B. canadaensis* (Schofield, 2006). *B. recurvans* is the most common species in N. America. So far most specimens from N. America have been identified as *B. recurvans*. In fact, we found that some specimens did not match the criteria of *B. recurvans*, belong to the concept of this species, but belong to *B. complanata*, *B. candaensis*, *B. fauriei* and *B. erythrocaulis*. It is distinguished from the other species of *Brotherella* in 1) apex strongly curved and evidently toothed; 2) supra cells moderately large and hyaline. Sometimes this species is very similar to *Hypnum* in the appearance.

In China, this species also was reported in Jiangsu (Liu *et al.*, 1989), Taiwan (Nakanishi, 1963; Nakanish, 1964; Wang, 1970; Lai and Wang, 1976; Kuo and Kiang, 1987; Lin, 1988). However, the report from Taiwan has no citation on specimens. Yet we failed to find any specimens from Jiangsu. Thus we are treating these earlier reports of *B. recurvans* in China as the doubtful records.

## 2. 纤枝疣胞藓 (新拟) Qian-Zhi-You-Bao-Xian

*Clastobryum cuculligerum* (Sande Lac.) Tixier, J. Hattori Bot. Lab. **32**: 28. 1969. Fig. 2

*Hypnum cuculligerum* Sande Lac., Bryol. Jav. **2**: 218. pl. 319. 1870.

Plants small, loosely tufts, golden-yellow, glossy, irregularly branched, 1.5–2.0 cm long, branches 0.4–0.6 cm long. Leaves loosely arranged on stems and branches, spreading-patent when dry.

Stem leaves similar to branch ones in shape and size. Leaves narrowly lanceolate, apex usually tortuous, 1.4–2.0 mm long, 0.25–0.35 mm wide, leaf margins denticulate above middle; cells thin-walled, narrowly rhomboidal, alar cells strongly differentia-

ted, consisted of 3–5 walls strongly thickened, colored, inflated cells. Perichaetial leaves evidently differentiated from vegetative leaves; inner ones widely triangularly lanceolate with a long acuminate, denticulate above middle, median leaf cells clearly porose.

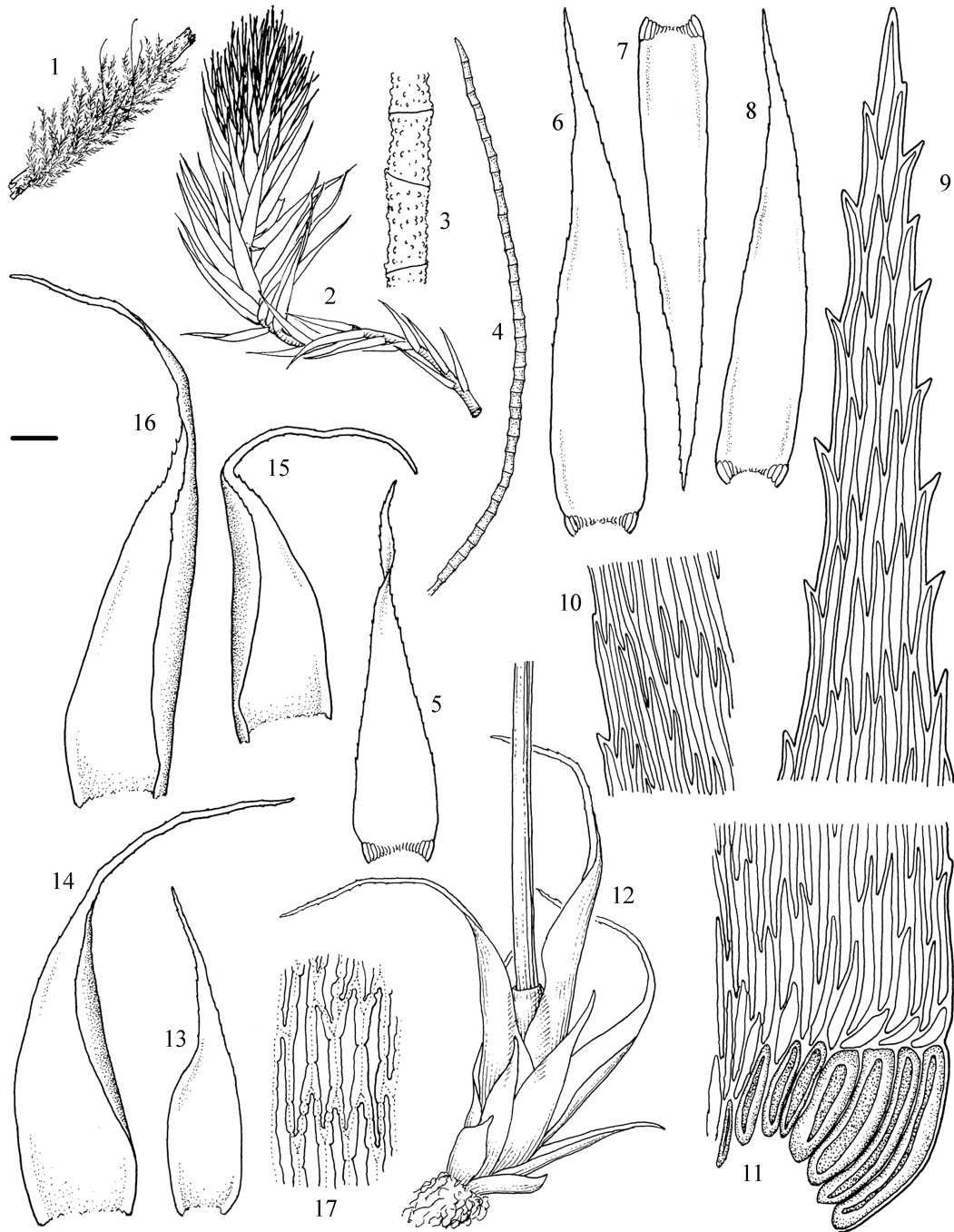


Fig. 2 *Clastobryum cuculligerum* (Sande Lac.) Tixier

1. Habitat; 2. A portion of branch; 3. A portion of gemmae; 4. Gemmae; 5–8. Leaves; 9. Apical leaf cells; 10. Median marginal leaf cells; 11. Basal leaf cells; 12. A portion of setae with perichaetial leaves; 13–16. Perichaetial leaves. (drawn from 1977 Expedition Team 2148 (IBSC). Scale bars: 1=0.67 mm; 2=0.48 mm; 3=18.20  $\mu$ m; 4=90.91  $\mu$ m; 5–8, 13–16=0.18 mm; 9–11, 17=18.20  $\mu$ m; 12=0.24 mm.) (Drawn by M. S. Guo)



Seta 1.5–2.2 cm long, smooth. Capsule not seen.

Numerous gemmae growing on the top of branches. Gemmae smooth to loosely and weakly papillose.

**Habitat:** on branch of tree, 1 600–1 700 m.

**Distribution:** Cambodia (Tixier, 1977), Indonesia (Dozy and Molkenboer, 1870; Tixier, 1977), Japan (Iwatsuki, 2004), Malaysia (Yong *et al.*, 2013), Papua New Guinea (Tan *et al.*, 2011), Philippines (Tan and Iwatsuki, 1991), Sri Lanka (Tixier, 1977; O'Shea, 2002), Thailand (Tixier, 1977), Vietnam (Tixier, 1977), New to China.

Examined specimens: Hainan: Tongshen County, 1977 Expedition team 2148, 2256 (IBSC).

*Clastobryum* is a genus largely distributed in tropical region, and there was only one species—*C. glabrescens* was reported in China previously (Tan and Jia, 1999), which is characterized by its sharply tristichous phyllotaxy. *Clastobryum cuculligerum* is the second species of *Clastobryum* found in China.

*Clastobryum cuculligerum* as compared to *C. glabrescens*, is pretty small and slender, and often epiphytically grows on branches as well. Plants are glossy, leaves are lanceolate, and leaf margins clearly serrate above. Median leaf cells are clearly porose. *Clastobryum cuculligerum* has weakly papillose to smooth propagules (Tan and Iwatsuki, 1992). Tixier's Illustrations (Tixier, 1969, 1977) about this species showed smooth gemma, but Chinese specimens have weakly and loosely papillose while plants from Papua New Guinea plants also have been papillose (Tan *et al.*, 2011). Tan and Iwatsuki (1992) considered that *Clastobryum cuculligerum*, *C. indicum* and *C. conspicuum* had been confused in herbarium, but *C. cuculligerum* differs from *C. indicum* in having serrate leaf margins and linear leaf cells. Dixon (1924) noted that the perichaetial leaves were slightly denticulate only, but the serration is very distinctive in our Chinese materials.

### 3. 海岛麻锦藓 (新拟) *Hai-Dao-Ma-Jin-Xian*

*Taxithelium liukiuense* Sak., Bot. Mag. 46: 505. 1932. Fig. 3, 4

Plants large, golden yellow, glossy. Regularly or irregularly pinnately branched, stem 6–8 cm long, branches 0.8–1.5 cm long, 1.2–1.5 mm wide with leaves. Stem leaves ovate-lanceolate with shortly acumens, strongly contracted at base, leaf margins denticulate, 1.4–1.6 mm long, 0.4–0.6 mm wide, alar cells differentiated, with 3 inflated, hyaline cells; branch leaves similar to stem ones in shape, only narrower than stem ones, strongly contracted at base, leaf margins denticulate, 1.2–1.5 mm long, 0.3–0.4 mm wide, cells linear, thin-walled, with 3–5 papillose, the papillose stellate or irregular in shape, 45–108  $\mu\text{m}$  long, 4–6  $\mu\text{m}$  wide, alar cells differentiated, 3 inflated and hyaline cells, 35–50  $\mu\text{m}$  long, ca. 20  $\mu\text{m}$  wide. Perichaetial leaves triangle-lanceolate, with denticulate. Seta smooth, 1.7–1.9 cm long, capsules cylindric, 0.9–1.0 mm long, 0.5–0.7 mm in diameter. Peristome teeth double. Spores smooth, sphaerical, 11–15  $\mu\text{m}$  in diameter.

**Distribution:** Japan (Noguchi *et al.*, 1994). New to China.

Examined specimens: Hainan: Baipo, C. Ho 1155, 1285 (PE), Shamojue, C. Ho 1049 (PE). HongKong: New Territories, Lin Bang-Juan *et al.* 1793 (IBSC).

Sakurai (1932) considered *T. liukiuense* was very similar to *T. nepalense*, especially in the shape of leaf, only slightly smaller than the latter. However, Seki (1968) stated it bore much resemblance to *T. instratum*, but the large seriate papillae on leaf-cell were very unique. According to Câmara (2011b), this species should be more closely related to *T. instratum* for lacking upper quadratic alar cells. Noguchi *et al.* (1994) provided quantity illustration of *T. liukiuense* drawn from its isotype specimens.

*Taxithelium liukiuense* was regarded as an endemic and rare species to Japan. Câmara (2011a) did not check its type specimens, neither had any comments on it in his revision work. It was obvious that Câmara mistook the information of type specimen, for it was deposited in Kyuichi Sakurai Herbarium (MAK), not in K or BM.

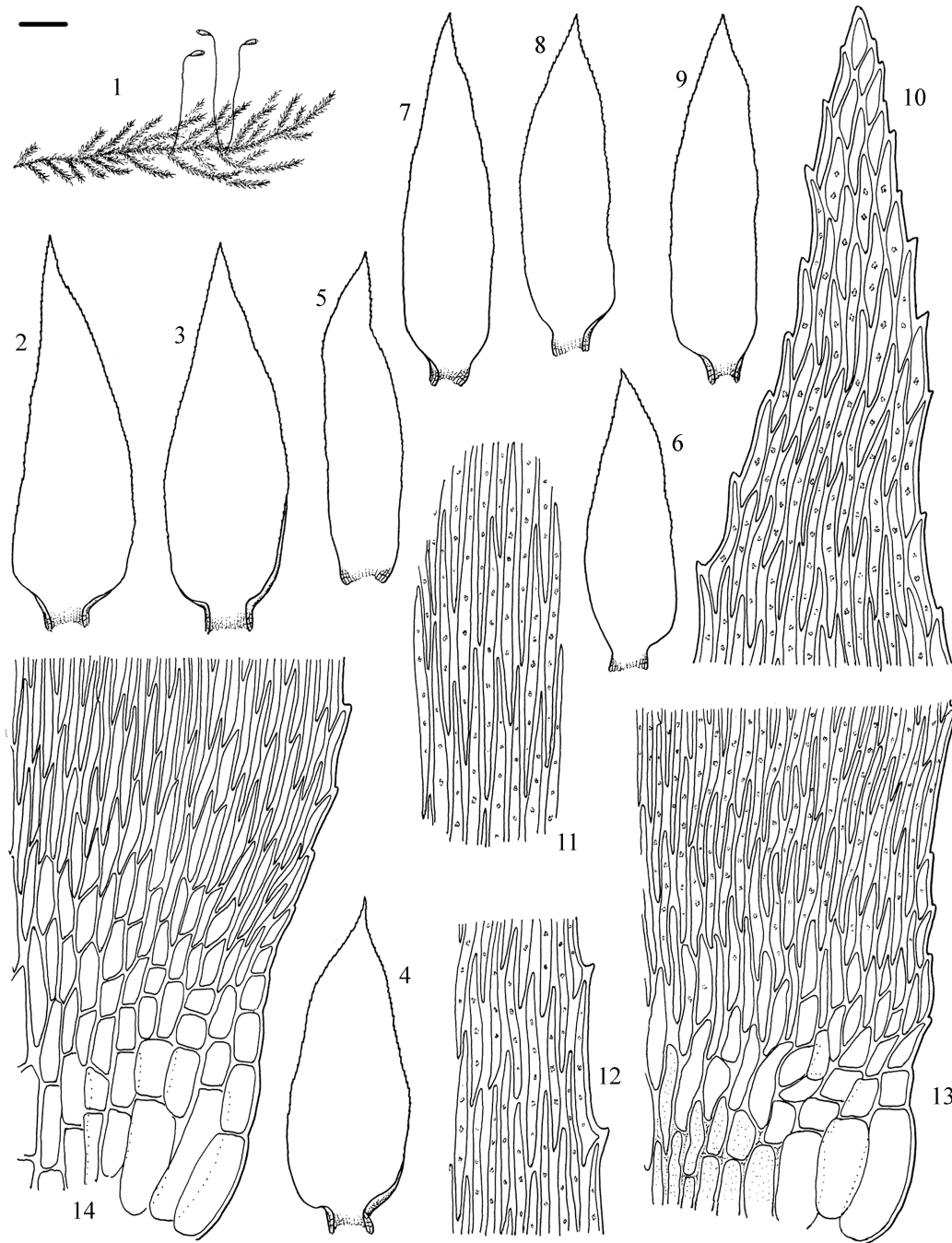


Fig. 3 *Taxithelium liukuense* Sak.

1. Plant; 2-4. Stem leaves; 5-9. Branch leaves; 10. Apical leaf cells; 11. Median leaf cells; 12. Median marginal leaf cells; 13. Basal leaf cells of branch; 14. Basal leaf cells of stem. (drawn from Lin Bang-Juan *et al.*, 1793 (IBSC).

Scale bars: 1=0.67 mm; 2-9=0.2 mm; 10=12  $\mu\text{m}$ ; 11-14=18  $\mu\text{m}$ ) (Drawn by M. S. Guo)

#### 4. 扭尖金枝藓阔叶变种 (新拟) *Niu-Jian-Jin-Zhi-Xian-Kuo-Ye-Bian-Zhong*

*Trismegistia calderensis* (Sull.) Broth. var. *rigida* (Mitt.) H. Akiy., *Humans & Nature* **21**: 11. 2010. Fig. 5, 6

*Acanthodium rigidum* Mitt., *J. Linn. Soc., Bot.*

**10**: 182. 1868.

*Trismegistia rigida* (Mitt.) Broth., *Nat. Pflanz-enfam.* **1** (3): 1078. 1908.

Plants medium, stiff, yellow-green or golden

yellowish, more or less glossy, irregularly branched, 5.0–8.0 cm long, branches 0.8–1.5 cm long, 2.2–2.6 mm wide with leaves. Leaves spreading when dry. Stem leaves and branch leaves differentiated in shape and size. Stem leaves widely ovate, 2.5–3.0 mm long, 1.0–1.2 mm wide, with a long and flexuous acuminate, the length of acumen longer than one of lami-

na, denticulate above, entire below, leaf cells nearly same in shape and size, incrassate, clearly porose, median leaf cells 36.4–47.2  $\mu\text{m}$  long, 3.2–5.0  $\mu\text{m}$  wide, upper leaf cells gradually becoming shorter, 17.3–26.3  $\mu\text{m}$  long, 4.7–5.6  $\mu\text{m}$  wide; forming a clearly differentiated border with linear cells, incrassate, porose, 34.1–53.9  $\mu\text{m}$  long, 6.1–9.2  $\mu\text{m}$  wide;

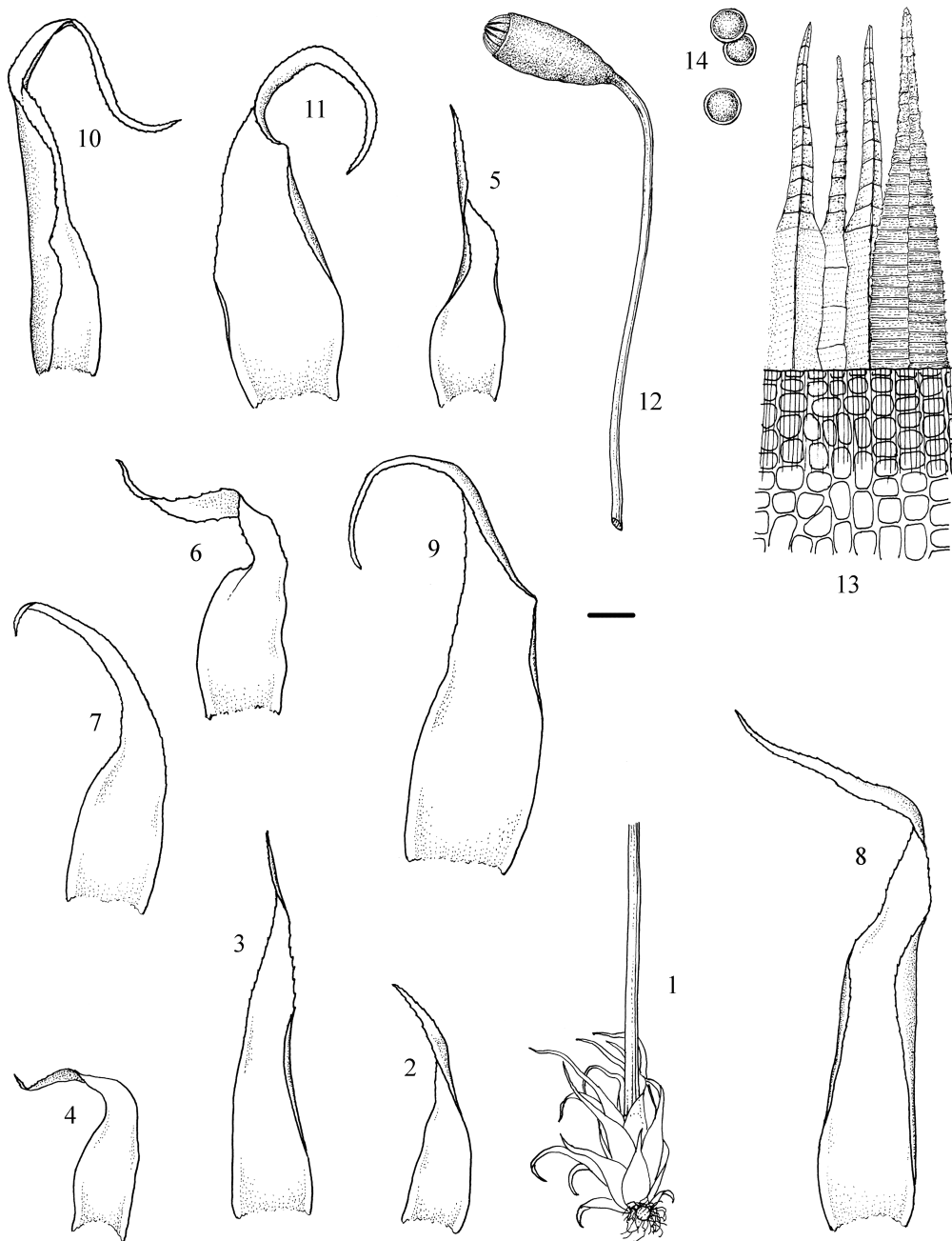


Fig. 4 *Taxithelium liukiense* Sak.

1. A portion of setae with perichaetial leaves; 2–11. Perichaetial leaves; 12. Capsule; 13. A portion of peristome; 14. Spores. (drawn from Lin Bang-Juan *et al.*, 1793 (IBSC). Scale bars: 1, 12=0.48 mm; 2–11=0.15 mm; 13=35  $\mu\text{m}$ ; 14=18  $\mu\text{m}$ .) (Drawn by M. S. Guo)

alar regions strongly differentiated, colored, forming an auriculate. Branch leaves lanceolate, acuminate, serrate above, entire below, 1.8–2.5 mm long, 0.3–0.6 mm wide, leaf cells incrassate, linear, median leaf cells 43.68–66.10  $\mu\text{m}$  long, 4.65–5.27  $\mu\text{m}$  wide, gradually becoming shorter towards upper.

Sporophytes not seen.

**Habitat:** on tree trunk base, 1 000 m.

**Distribution:** Cambodia (Akiyama, 2010), Indonesia (Akiyama, 2010), Malaysia (Akiyama, 2010), Philippines (Akiyama, 2010), Thailand (Akiyama, 2010), Vietnam (Akiyama, 2010). New to China.

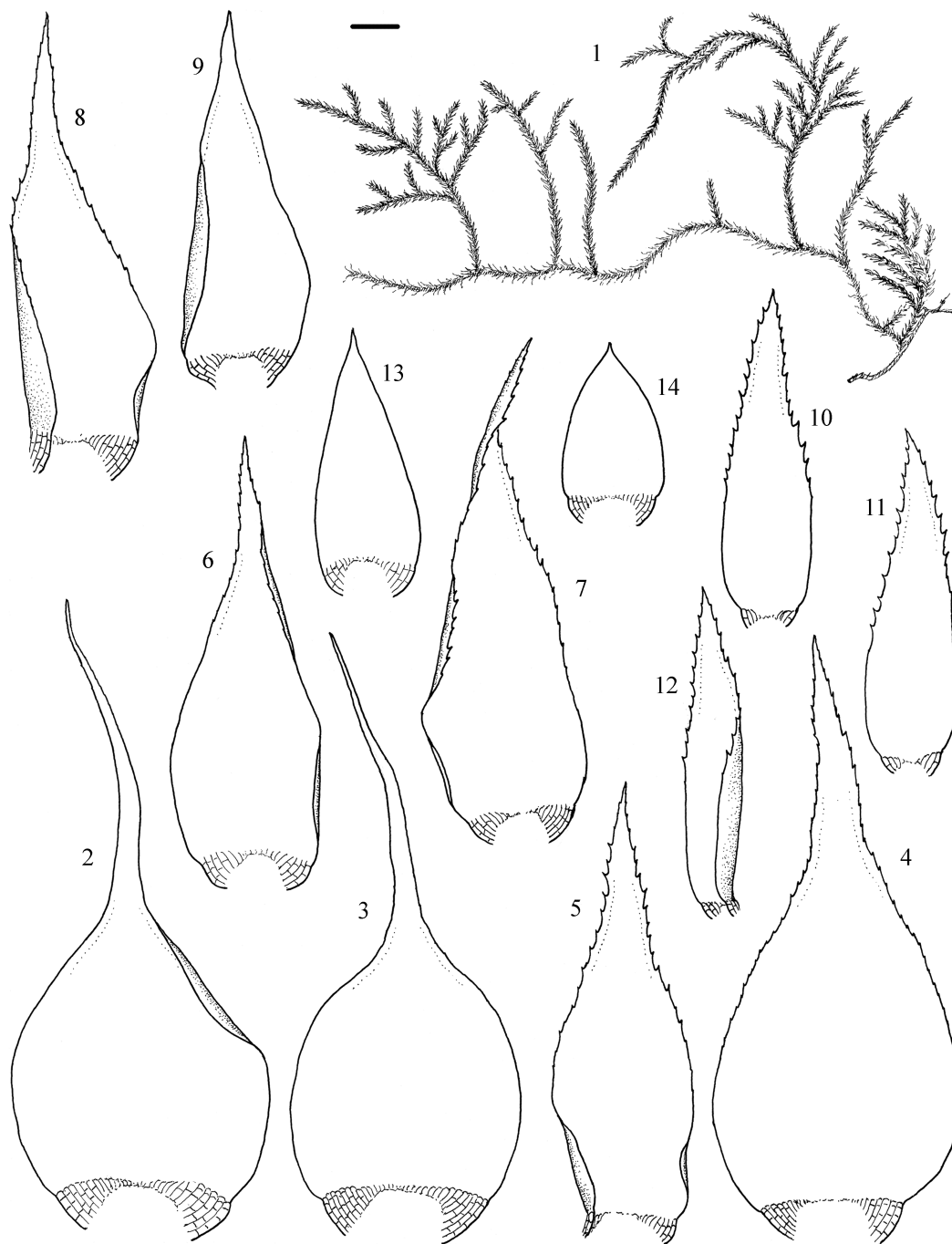


Fig. 5 *Trismegistia calderensis* (Sull.) Broth. var. *rigida* (Mitt.) H. Akiy.

1. Plant; 2–3. Stem leaves; 4–14. Branch leaves. (All drawn from Wang Mei-Zhi 45770 (PE).)

Scale bars: 1=0.67 mm; 2–14=0.25 mm (Drawn by M. S. Guo)



Examined specimens: Hainan, Ledong County, 1 000 m, on tree trunk base, Wang Mei-Zhi 45770 (PE), Lin You-Xing 451 (PE); Dongfang County, Zhang Li 1545 (IBSC); Linshui County, Mt. Diaoluoshan, Lin Bang-Juan 3495 (IBSC).

*Trismegistia calderensis* var. *rigida* is characterized by its stem leaves broadly ovate with a very long acuminate, leaf margin cells clearly differentiated at shoulder, much larger than those in the other places, and secondary branch leaf lanceolate. In addition,

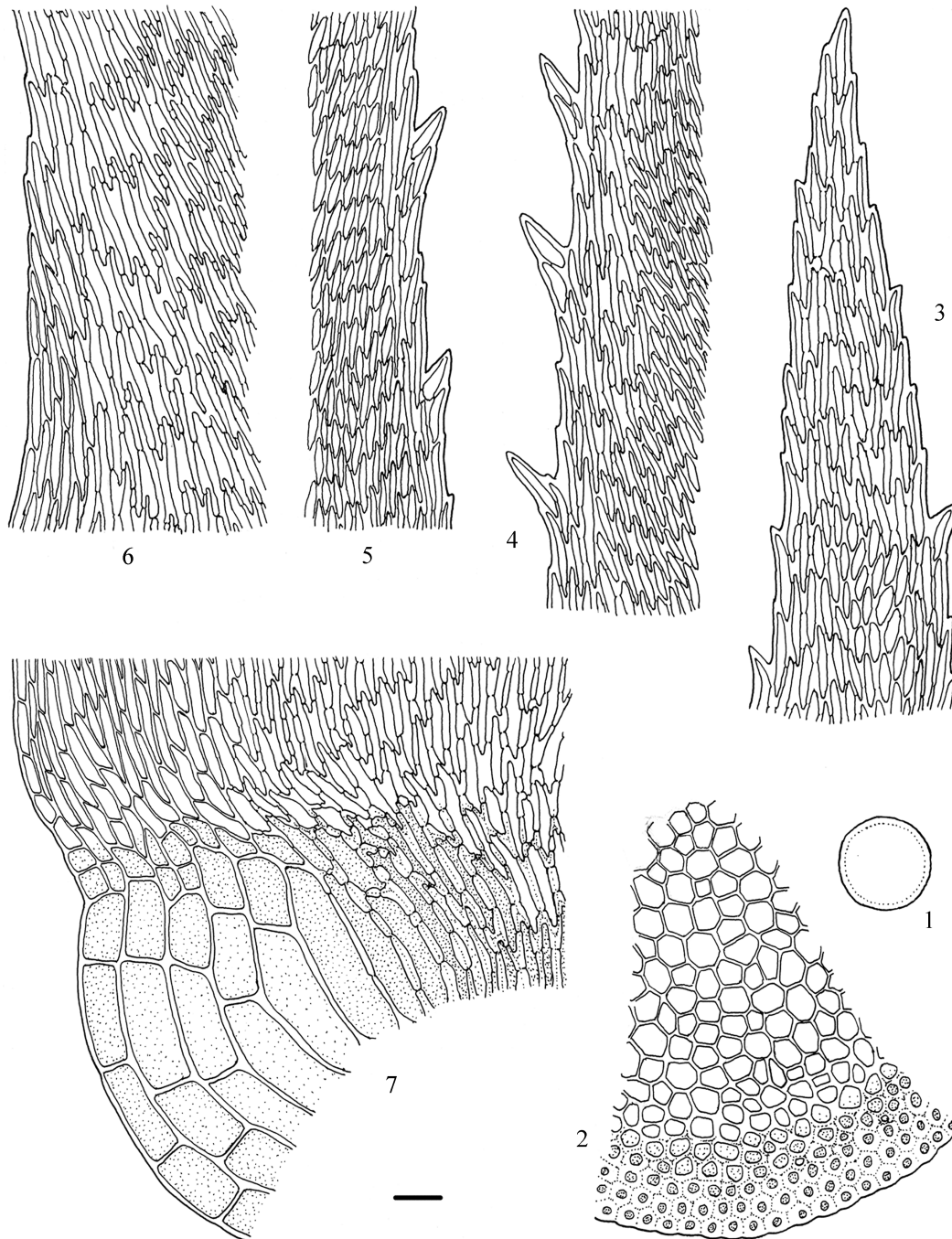


Fig. 6 *Trismegistia calderensis* (Sull.) Broth. var. *rigida* (Mitt.) H. Akiy.

1. Cross section of stem; 2. A portion of cross section of stem; 3. Apical leaf cells; 4–5. Median marginal leaf cells of branch; 6. Marginal leaf cells of stem; 7. Basal leaf cells. (All drawn from Wang Mei-Zhi 45770 (PE).

Scale bars: 1 = 0.24 mm; 2 = 26  $\mu$ m; 3–7 = 26  $\mu$ m) (Drawn by M. S. Guo)

stem leaf margins are entire below. Akiyama (2010) noted specimens collected from Vietnam and Cambodia are much smaller in size compared to those collected from other parts of the distributed range. The Chinese materials are larger, up to 8 cm.

## References:

- Akiyama H, 2010. Taxonomic revision of the genus *Trismegistia* (Pylaisiadelphaceae, Musci) [J]. *Humans & Nature*, **21**: 1—77
- Ando H, Seki T, Schofield WB, 1989. Generic distinctness of *Brotherella* from *Pylaisiadelpha* (Musci) [J]. *The Bryologist*, **92**: 209—215
- Buck WR, 1984. *Pylaisiadelpha* replaces *Brotherella* (Sematophyllaceae) [J]. *Yushania*, **1** (2): 11—13
- Buck WR, Goffinet B, 2000. Morphology and classification of mosses [A]. In: Shaw AJ, Goffinet B (eds.), *Bryophyte Biology* [M]. Cambridge: Cambridge University Press, 71—123
- Câmara PEAS, 2011a. A re-circumscription of the moss genus *Taxithelium* (Pylaisiadelphaceae) with a taxonomic revision of Subgenus *Vernieri* [J]. *Systematic Botany*, **36** (1): 7—21
- Câmara PEAS, 2011b. A Review of *Taxithelium* Subgenus *Taxithelium* (Bryophyta, Pylaisiadelphaceae) [J]. *Systematic Botany*, **36** (4): 824—835
- Crosby MR, Magill RE, Allen B et al., 1999. *A Checklist of the Mosses* [M]. St. Louis: Missouri Botanical Garden Press, 1—306
- Crum HA, Anderson LE, 1981. Sematophyllaceae [A]. In: Mosses of Eastern North America [M], Vol. 2. New York: Columbia University Press, 1105—1126
- Dixon HN, 1924. New species of mosses from Malay Peninsula [J]. *Bulletin Torrey Botanical Club*, **51**: 225—260
- Dozy F, Molkenboer JH, 1870. *Bryol. Jav. 2* [M]. A. W. Sythoff, Leiden, 1—238
- Frey W, Stech M, 2009. Bryophytes and Seedless Vascular Plants. 3: I-IX. In: Syl. Pl. Fam. ed. 13 [M]. Berlin: Gebr. Borntraeger Verlagsbuchhandlung, 1—263
- Goffinet B, Buck WR, 2004. Systematics of the Bryophyta (mosses): from molecules to a revised classification [J]. *Monographs Syst Bot Missouri Bot Gard*, **98**: 205—239
- Iwatsuki Z, 2004. New catalog of the mosses of Japan [J]. *The Journal of the Hattori Botanical Laboratory*, **96**: 1—182
- Jia Y (贾渝), Wu PC (吴鹏程), 2004. Sematophyllaceae [A]. In: Wu PC, Jia Y (eds.), *Flora Bryophytorum Sinicorum* (中国苔藓志). Vol. 8 [M]. Beijing: Science Press, 1—88
- Jia Y, Wu PC, Tan BC, 2005. Sematophyllaceae [A]. In: Wu PC, Crosby MR (eds.), *Moss Flora of China* (English Version), Vol. 8 [M]. Beijing: Science Press, 3—79
- Kuo CM, Chiang TY, 1987. Index of Taiwan mosses [J]. *Taiwania*, **32**: 119—207
- Lai MJ, Wang-Yang JR, 1976. Index bryoflorae formosensis [J]. *Taiwania*, **21** (2): 159—203
- Lin SH, 1988. List of mosses of Taiwan [J]. *Yushania*, **5** (4): 1—40
- Magill RE, Crum H, Buck WR, 1994. Sematophyllaceae [A]. In: Sharp AJ, Crum H, Eckel PM (eds.), *The Moss Flora of Mexico* [M]. New York: Memoirs of the New York Botanical Garden, **69**: 974—1009
- Mitten W, 1859. The mosses of the east indies [J]. *Journal of the Proceedings of the Linnean Society, Botany Supplement*, **2**: 1—157
- Nakanishi S, 1963a. A record of travels in Taiwan [J]. *Hikobia*, **3**: 316—327
- Nakanishi S, 1963b. Epiphytic communities in the alpine zone of Mt. Yu-shan (Mt. Niitaka), Taiwan [J]. *Miscellanea Bryologica et Lichenologica*, **3**: 71—72
- Noguchi A, Iwatsuki Z, Yamaguchi T, 1994. *Illustrated Moss Flora of Japan, part 5* [M]. Nichinan: Hattori Botanical Laboratory, 1013—1253
- O'Shea BJ, 2002. Checklist of the mosses of Sri Lanka [J]. *The Journal of the Hattori Botanical Laboratory*, **92**: 125—164
- Sakurai K, 1932. Beobachtungen ber japanische Moosflora (II) [J]. *Botany Magazine*, **46**: 496—509
- Schofield WB, 2006. *Brotherella Canadensis* sp. nov., from the Pacific coast of North America [J]. *The Journal of the Hattori Botanical Laboratory*, **100**: 355—360
- Seki T, 1968. A revision of the family Sematophyllaceae of Japan with special reference to a statistical demarcation of the family [J]. *Journal of Science Hiroshima University, series B, Division 2 (Botany)*, **12**: 1—80
- Tan BC, Iwatsuki Z, 1991. A new annotated Philippine moss checklist [J]. *Harvard Paper in Botany*, **3**: 1—64
- Tan BC, Iwatsuki Z, 1992. Lectotypification of *Clastobryum indicum* and *C. conspicuum* [J]. *Hikobia*, **11**: 147—152
- Tan BC, 2000a. Addition to the moss flora of Mt. Wilhelm [J]. *The Journal of the Hattori Botanical Laboratory*, **89**: 173—196
- Tan BC, 2000b. A revision of Yunnan Sematophyllaceae, a new variety (*Brotherella nictans* var. *zangmu-xingjiangii*), a new combination (*Sematophyllum curvirostre*), and two new records of non-Sematophyllaceae mosses for China [J]. *Hikobia*, **13**: 185—193
- Tan BC, Jia Y, 1999. A preliminary revision of Chinese Sematophyllaceae [J]. *The Journal of the Hattori Botanical Laboratory*, **86**: 1—70
- Tan BC, Koponen T, Norris DH, 2011. Bryophyt flora of the Huon Peninsula, Papua New Guinea. LXXII. Sematophyllaceae (Musci) 2. *Brotherella*, *Clastobryum*, *Clastobryopsis*, *Heterophyllum*, *Isocladiella*, *Isocladiellopsis*, *Meiotheciella*, *Meiothecium*, *Papillidiopsis*, *Rhaphidostichum* and *Wijkia* [J]. *Acta Bryologica Asiatica*, **4**: 3—58
- Tixier P, 1969. De Sematophyllaceis. I. Essai de Revision des Clastobryaceae de Luzon [J]. *The Journal of the Hattori Botanical Laboratory*, **32**: 21—34
- Tixier P, 1977. Clastobryoidées et Taxa apparentes [J]. *Revue Bryologique Lichénologique*, **43** (4): 397—464